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HYBRIDS OF THE SMALLER DAFFODILS.

(By Dr. W. M. Thomson, Taranaki Vice-President).

I have recently looked through 20 years of the 'Gardeners' Chronicle and noted all references to Daffodils. There is mention of crosses of triandrus and Jonquilla with the larger forms but, apart from these, there are only four crosses mentioned between the species:—minimus which is minimus x cyclamineus; Fairy Wings, cyclamineus x poeticus; Silver Chimes, Tazetta x calathinus; Trimon, triandrus albus x Bulbocodium monophyllum. Of these only the first and last are crosses of the smaller species, so it seems worth while to record the crosses I have made and attempted over a good many years now.

In the Gardeners' Chronicle several local forms of Narcissus Bulbocodium are described, such as a high Atlas form. N. Graellsii is another from Spain; described from Kew as having a green-striped calyx and a corona half an inch long and the same wide. It is from Guadarrama, the locus of other small narcissi such as juncifolius var. rupicola. Col. Enever Todd mentions a white Spanish form to which he applies the name N. Bulbocodium var. Clusii and he describes it as growing well in the gardens of Government House at Gibraltar. One hopes these may become available to us some day.

Narcissus Trimon is illustrated in the Gardeners' Chronicle, January to June 1925, page 77. It is that almost unbelievable cross between triandrus and Bulbocodium monophyllum, produced by Miss Willmott, V.M.H., at Great Warley. There is a healthy clump showing some twenty flowers. These are recognizably monophyllum but the influence of triandrus can be seen in several characters; the flowers are taller than monophyllum, they have a longer tube and are carried more horizontally. What a thrill to have produced them and what a challenge to try to do it again! I shall long for the opportunity, but the only hope is an unusually early flower of triandrus or a late one of monophyllum.

The species used have been:—minimus, cyclamineus, Jonquilla, juncifolius, triandrus albus, triandrus calathinus, moschatus, and canaliculatus; and on these has been used the pollen of many others including paper white, and other tazettas, poetaz, cernuus (or, at

least an early white trumpet), telamonius and this year for the first time Watieri. I have also tried to use the bulbocodiums but with no success at all so far.

For some years I used pots but have lost so many through the autumn droughts that I now sow in the open. Even so care must be taken to choose the right conditions; warm and dry sites suit the triandrus varieties and Jonquilla but minimus dies out. Most of them, especially cyclamineus and minimus, are quite happy in moister soil and in a site which gets only morning sun. I have unfortunately lost moschatus but still have some of its offspring.

Minimus x cyclamineus produces a very charming miniature of which I give an illustration. It was raised by a Mr. Chapman and given an A.M. under the name 'minicycla'; and figured in the "Garden" on 8th February, 1913. It presents a very interesting mixture of the characters of its parents. Cyclamineus has no tube, for both perianth and corona spring from the same level at the top of the ovary; its cup is a smooth cylinder of about the diameter of a lead-pencil, toothed at the margin and the perianth flares straight back, hence its specific name. On the other hand minimus has a tube about one fourth the length of the trumpet, the edge of which is slightly rolled and the trumpet is somewhat inflated in its lower part; the perianth segments stand out at an angle of about 45 degrees. Minicycla strikes a happy mean in all these respects; it has a very short tube, the trumpet is not inflated but expands slightly towards the mouth and has the edge slightly rolled while the perianth stands out at a right angle with the tips curling back elegantly: the whole effect is dainty and delightful. It sets seed well and I am now growing some to see if there is any Mendelian segregation in the seedlings.

Minimus crossed with Tazetta gives twin or triple flowered intermediates in which the influence of minimus shows in dwarfness and in the size and shape of the cup; also in their earliness. They are not outstanding but very suitable for the rockery. One seedling, probably from pollen of Soleil d'Or, is taller and bigger all round. It produced seed last year and three have germinated but I do not know the pollen parent as I took no note of the cross, not expecting any result; it was either triandrus or cyclamineus, probably the latter. This year there were two spikes and each has been pollinated with one of these, but without result.

Minimus crossed with Telamonius gave a number of seedlings of which some 16 or 18 have flowered. Five of them are doubles and of these one is greenish but may show up better another year. I have found this greenness with other Telamonius seedlings. A second has a fairly large trumpet tightly stuffed and not at all elegant, but the three others are more open and promise very well; they are being grown on separately to test them out. They are less than six inches high and should be good plants for rockery or alpine house as they seem to have some of the vigour of their larger parent. One of them has surprised me by producing a seed

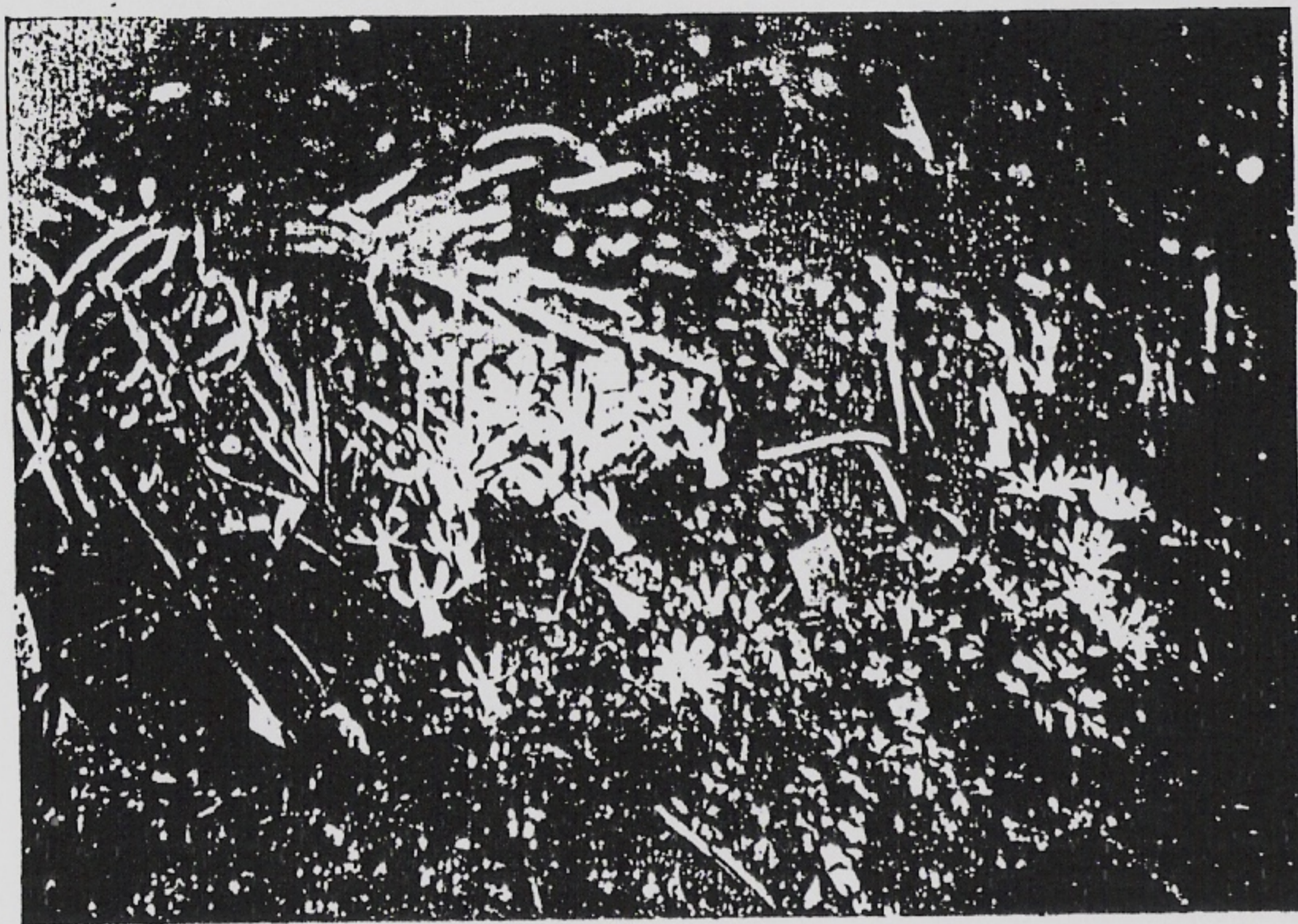


Fig. 1. Minicycla (minimus x cyclamineus).
In centre: Anemone blanda. On right:
cyclamineus.



pod and six good seed, so that it may become a valuable parent. Argent is the only large double that I know of that is capable of setting seed. Minimus crossed with pollen of an early white trumpet, perhaps cernuus, has given nine or ten seedlings not of much vigour, which is perhaps due to poor cultivation on my part; two have flowered this year and one is a cream-coloured minimus. It will be given better conditions for it is quite worth carrying on. Like so many other cream daffodils it becomes almost pure white as it ages.

Minimus cross triandrus albus is something to be greatly desired; I very seldom have the opportunity to make this cross but it succeeded once and there is a rather poor picture of the flower produced. It is without exception the most beautiful little daffodil I have seen; its shape and port are most graceful, the perianth is pale yellow but the trumpet is almost ivory. Unfortunately my efforts to do it well have not been happy and I have almost lost it but it must be produced; the world must not lose such a lovely thing. This year there have been only two available minimus flowers; one has had pollen of triandrus and the other of Watieri; the cernuus seedling was also tried but has not set, nor have the others.

Pollen of minimus on juncifolius has given three seedlings of which one flowered this year. This is a dwarf of dwarfs both in leaf and flower; the flower stem is three and a half inches high and the flower measures less than an inch each way but it is certainly a little beauty. It seems fairly vigorous and I hope will multiply for it will be most welcome as a pot plant; it has been touched with pollen of triandrus, but without result. I have so far quite failed to achieve the cross of minimus and Jonquilla though it has been tried reciprocally but only on a small scale for the plants are seldom in flower together. I visualize a miniature campernelle jonquil, a consummation devoutly to be desired, for in my estimation the campernelle is almost the most graceful of all daffodils.

My original stock of minimus has almost disappeared but there is one fairly good batch of seedlings coming on so I hope to be able to carry on this fascinating game. The character of dwarfness seems to be dominant. I believe its proper name is *Narcissus minor* var. *minimus*; *Asturienensis* is given in E. A. Bowles's book. Minor itself multiplies very freely in my garden but is a very shy flowerer so that I have hardly used it at all. I have shifted some bulbs to a more sunny site and hope for better behaviour next year. Its flowers are like those of minimus in the inflation of the lower part of the trumpet. I crossed it with pollen of *cyclamineus* and got ten seed; seven have germinated but are not doing well, perhaps because the site is too dry. They will be given a chance in a more genial site. Pollen of minor on *calathinus* gave a few seed but none have germinated. If it will flower more freely in future it must be tried with triandrus pollen in the hope of getting something like the minimus cross; but it is more likely to give a small

HYBRIDS OF THE SMALLER DAFFODILS.

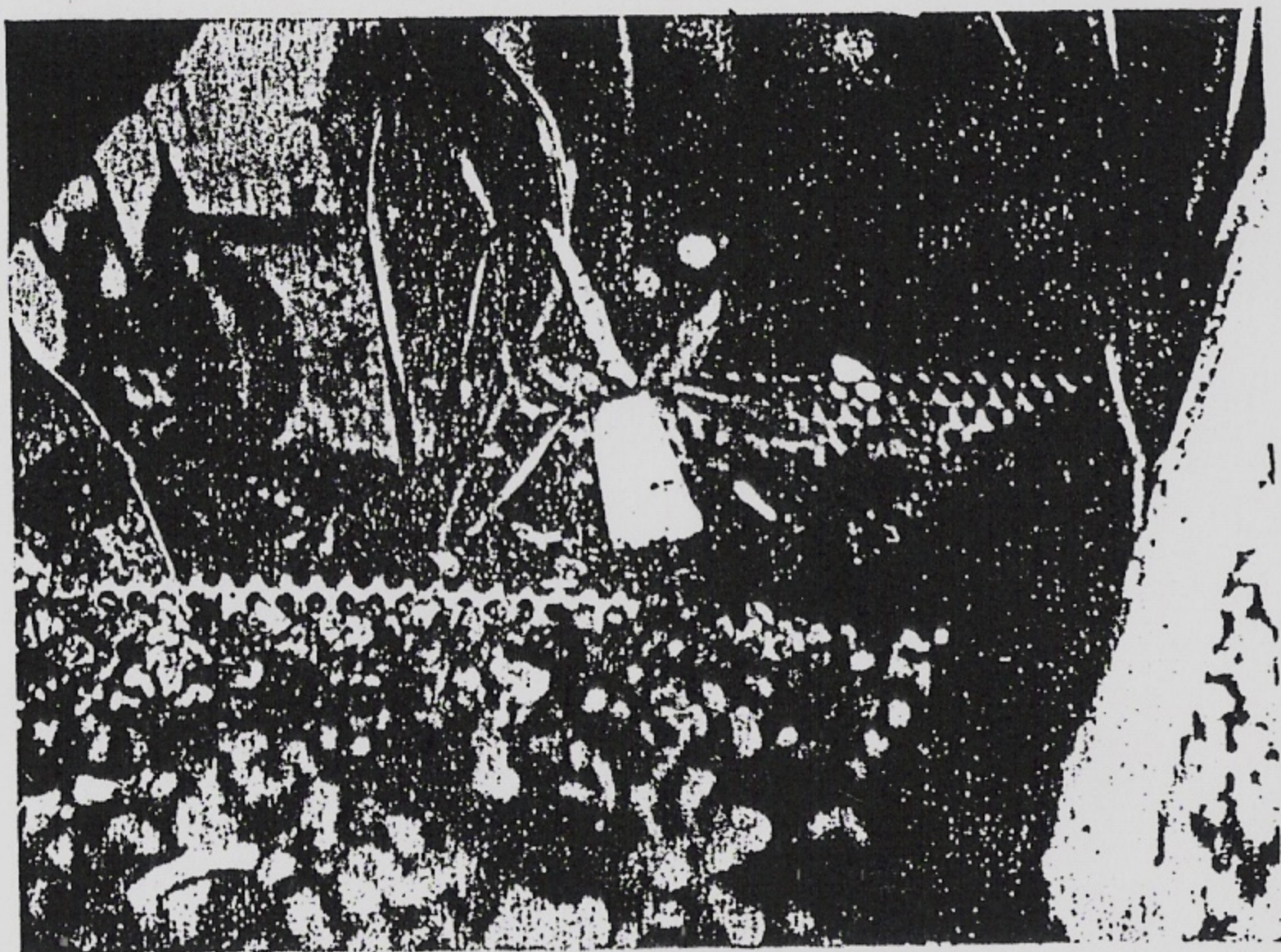


Fig. 3. *Minimus x triandrus albus*.



Fig. 4. *Cyclamineus x Tazetta*.

edition of that old favourite, Bennett Poe, a plant which I have reproduced many times with pollen of calathinus on various trumpets, sometimes with twin flowers. One does not expect its progeny to have quite the appeal of the minimus midgets but there is always a glorious uncertainty in plant breeding and one sometimes gets a most pleasant surprise in unexpected places.

My efforts at the photography of these small flowers are not always very successful but I hope some of them can be reproduced sufficiently well to give some idea of their character. I hope to do better in future so that, even if the plants do not multiply enough for distribution, there may be something on record to show others interested what may be accomplished.

CYCLAMINEUS.

In the volume on Daffodils in the present-day gardening series, written by the Rev. Joseph Jacob, it is noted that hybrids of cyclamineus are usually of weak constitution. One of my early crosses bears this out for the plants have not grown vigorously and took thirteen years to come into flower. However, that seems only true of crosses with the larger trumpets. I have already mentioned the cross with minimus, minicycla. This is quite a healthy and vigorous little plant though it has not yet shown much disposition to multiply. Cyclamineus crossed with a Tazetta seedling of my own, has given some thirty plants that show quite normal vigour and that are multiplying at a satisfactory rate. The pollen parent is a yellow bicolor reminiscent of Soleil d'Or, but not as brilliant. The flowers are all of cyclamineus shape and number from one to five or more in the head. All are yellow, some selfs and some with paler perianths. The chief fault is that the pedicels are rather short so that there is not always sufficient room for the perianth segments to turn back to the fully reflexed position. Even so they are well worth growing and I hope to put one or more up for trial. To overcome this one defect, I have tried to cross with Jonquilla reciprocally but so far without success. This has been tried for several years and again this year, and I hope to make many more trials for miracles sometimes happen as was the case with Narcissus 'Hawera' which will be mentioned later. Cyclamineus must not be grown in dry conditions: indeed I believe Mr. Peter Barr found it sometimes actually growing in water and more vigorous there than in drier places.

JONQUILLA.

The reactions of this species are so well known that I cannot add much to them. I have a copy of Mr. F. W. Burbidge's book:— "The Propagation and Improvement of Cultivated Plants," dated 1877. In it he quotes the experiments of Dean Herbert and Mr. Trevor who made crosses between the common daffodil, *N. pseudo-narcissus* and Jonquilla and thus proved that *N. odoratus* of Linnaeus,

the campernelle jonquil, in all its varieties, was of that parentage: they also note that odorus never sets seed. That mulish character of jonquil crosses is so well known that one learns surprise of one variety, which is fertile.

My outstanding success with it was to produce *N. x Hawera*. This was one of my very early attempts. I used pollen of *triandrus albus* on a number of flowers. There were 70 seedlings of which 69 were jonquils and only one showed the cross. I liked it so much that I tried many times over a longish period of years to reproduce it: grew jonquils in pots and emasculated all the flowers: capsules formed and sometimes ovules would swell up, but the capsules withered and the ovules became ghosts; a black coat would form but shrivelled, never a fat shiny black seed. I wish I knew the chromosome numbers. At a guess I would explain the facts thus:—impregnation actually takes place and causes an ovule to develop so far, but placental tissue fails to develop so that the ovule cannot mature. In the one successful case I imagine that the little cuckoo managed to share in the abundant placental tissues produced for the normal ovules formed. If this is so it suggests that it is not wise in every case to emasculate completely all the flowers one is pollinating in making any wide cross.

N. x Hawera was sent to Wisley for trial and I was notified that the daffodil committee of the R.H.S. had seen it and considered that it was equivalent to *N. triandrus pulchellus*. I tried to import this plant but was sent a collected, small-flowered form of *N. Bulbocodium*. This took years to flower so I have not seen *pulchellus*. 'Hawera' evidently took kindly to Wisley and seems to do much better there than in its birth-place. After nearly ten years it was put up for trial at the London Daffodil Show, was given an A.M. and rechristened 'Hawera' as it was recognized to be different from *pulchellus*. Its A.M. is for a plant suitable for alpine house culture. Within the last few years I have flowered a number of *triandrus* seedlings of much the same character, which I am sure are due to pollen of *Jonquilla*, but I cannot swear to the cross. They are taller than 'Hawera', some are yellow selfs but others have the paler edge to the trumpet that is seen in 'Hawera'! 'Hawera' seems to be a mule, but it is just possible that its pollen has caused *calathinus* to seed. There are four or five seedlings coming on that may settle that question.

Jonquilla and *juncifolius* have been crossed reciprocally and I have four groups of seedlings of which one certainly shows the combined characters: it is very free flowering, has a rounded perianth and a larger cup than *Jonquilla* and foliage intermediate between that of the parents. It is well worth growing. I shall refer to this cross later when discussing the question of heterostylism.

There is another batch of *Jonquilla* seedlings from flowers pollinated by *Soleil d'Or*. This was attempted because of a statement of Dean Herbert's quoted by Burbidge, that he never could produce seed by its pollen: and Burbidge in parenthesis re-



Fig. 5. N. x Hawera (*Jonquilla* x *triandrus* *albus*).



marks:—"doubtless because the bulbs have been raised by off-sets for three or four centuries"—and that was written sixty-four years ago! Under the microscope I have seen that *Soleil d'Or* produces some sound pollen grains and that they can produce tubes in a glucose solution. Perhaps it is a matter of temperature for the *Tazettas* do not seed well in colder climates and there is the analogous case of *Sir Watkin*, which, according to the Rev. J. Jacob, does not produce seed in England but does so spontaneously in the Blue Mountains of New South Wales. I should be very glad to hear from anyone who knows of *Soleil d'Or*'s pollen having caused seed to set. I have tried its pollen on my own *Tazetta* seedlings and have a number coming on but it will be several years before they or the jonquil seedlings flower.

I have not yet had time to test the *Jonquilla-juncifolius* cross as to its capacity to set seed but it is an important point to settle. In view of the mulish character of *Jonquilla*, the setting of seed would tend to show that the two species are closely related and possibly only varieties of one species, as are *triandrus albus* and *calathinus*. Of the four batches of seedlings, one seems to be pure jonquil in both leaf and flower; two have the flower of *juncifolius* but foliage and stature are intermediate; the fourth combines all the characters of both parents. It is the one which must be tested, by selfing some flowers and pollinating others with each of the parents. Seed produced in any of these ways would settle the question. Seed from selfed flowers would be interesting to watch from the Mendelian standpoint. One reason for crossing these two species was to find out if heterostylism has any effect in this case, either in the production of more abundant seed or in causing more vigorous growth. But so far neither condition has been observed. For the same reason the two *triandrus* varieties, *albus* and *calathinus*, have been crossed reciprocally in at least two seasons. As these two varieties are presumably more closely related than are *Jonquilla* and *juncifolius*, one might reasonably have expected a marked result, but that has not happened. With *albus* as seed parent very little seed is produced and there is poor germination, but *calathinus* as seed parent gives abundant seed and it germinates freely. The first year this was done the resulting plants were so few that no records were kept though they have flowered. There is some mingling of characters, for we find a few plants with the long style of *albus* and the larger cup and taller stature of *calathinus*. One early experiment was the crossing of the two *Bulbocodium* varieties, *conspicuous* and *citrinus*, the latter seed-parent. The result was large flowers, mostly deep yellow, produced two weeks earlier than *conspicuous*. This test certainly demonstrated the increased vigour due to the crossing of related varieties.

TRIANDRUS CROSSES.

Triandrus albus or angel's tears, has been the seed-parent in a cross with paper-white. There are three seedlings, tall and grace-

ful, with three to five or six flowers in which both parents show their influence. So far the bulbs have not multiplied. My photo was taken last year and does not do them justice. I have not succeeded with the reciprocal cross nor have I so far raised seed of the cross between calathinus and paper-white. Attempts to cross triandrus and cyclamineus have always failed.

Although it is so rare to get a cross between Jonquilla and triandrus albus with the former as seed parent, I am sure the reverse cross is much easier to accomplish, as has already been mentioned. Minimus x triandrus has already been dealt with: the reverse cross has produced about forty seedlings of which I have great hopes. Pollination with Telamonius has failed.

Pollen of Angel's tears on Leedsii has given dainty twins with white thimbles for cups and partly reflexed perianths.

Calathinus as a seed-parent gave three seedlings with pollen of Jaune a Merveille. One of these was a very beautiful plant: it was Jaune a Merveille with an even, flat perianth and a cup in the shape of a broad flat bowl of exactly the same soft yellow colour as the perianth. I thought it good enough for the F.C.C. as far as the flower went, but it was not a good doer, flowered a month too late for the shows and I am afraid is lost. This particular cross was one of the first I ever made and I do not quite know why I have not tried it more frequently: but it has been done again and there are two seedlings three years old. This year I have crossed twelve flowers in this way and hope to reproduce that good form again. More recently calathinus has been crossed with several large tazettas and with other poetaz forms and there are seedlings but so far nothing to report. There is a fine plant of this type in commerce, produced by Mr. P. D. Williams and named Silver Chimes.

Calathinus pollen is potent when used on the larger daffodils. Triandrus influence usually shows itself in the bell-shaped cup with a smooth, straight edge, also in the softening of the yellow colouring. Bennett Poe is a well-known example and I have reproduced it many times, in some cases with twin flowers. With "Peter Barr" some fine pure whites have appeared and there are also some good intermediates in each case also with twins.

Once years ago, I was given a flower of a triandrus variety named snowflake or snow-drop; the only flower available for pollination was a big tazetta, white with orange cup. Abundant seed set and quite a variety of tazettas was produced. A few of these show triandrus influence in the flaring back of the perianth but the others do not, except in the softened colouring. However they are early, set seed easily and have given me material to work on.

Triandrus albus pollen on moschatus has twice given offspring. One of the first batch flowered and gave a particularly attractive bloom; it was pure white, with a rather long, narrow trumpet and reflexed perianth. But the plants were grown in too dry a site and all disappeared. The next batch has been rather better treated: one has flowered and the others are multiplying freely. Mos-

chatus, I have twice imported, but have not been able to keep it for long. It has a very characteristic way of carrying the flower bent down parallel with the stem and it imparts this habit more or less to its progeny. I have one vigorous clump, the result of crossing *Libra* with its pollen. The carriage of the flowers is like *moschatus*, also the longish trumpet and the rather drooping perianth; the trumpet is cream with a somewhat frilled edge. Does any one in New Zealand grow *moschatus* really happily?

Admiring the *campernelle* jonquil as I do, I have often longed to get a white one, but that mulish character is an insuperable bar. It seemed that the next best thing would be a cross between paper-white and a white trumpet. This I have striven for vainly for many years. For one thing, it is very difficult to get a white trumpet of any sort early enough or to delay the flowering of paper-white sufficiently. Once I got one seed from *moschatus*; it germinated but was a complete albino and did not survive more than three months.

THE HOOP-PETTICOATS.

N. Bulbocodium conspicuus is very happy in Hawera gardens; it multiplies freely both by off-sets and seed and can be used as freely in our gardens as the yellow crocus in Dunedin, forming broad bands of colour. I was once given seed reputed to be from a particularly large flowered strain, sponsored by Mr. Clarence Elliott, but the flowers were not any larger than those of our local form. Actually the largest and tallest flowers I have seen were produced by the crossing of *conspicuus* and *citrinus*. Imported bulbs which came as *N. triandrus pulchellus* may have been a collected form; they multiplied very freely by off-sets for several years before flowering and then gave much smaller flowers than the local ones. I have lost all but one of them by allowing *Dryas octopetala* to smother them. *Conspicuus*, as already mentioned, seeds freely but *citrinus* rarely sets seed with me. Perhaps they have lost fertility as did *Lilium candidum* in gardens. This year I secured pollen from a neighbour and touched six flowers. One hopes to get plants that will set abundant seed spontaneously as has happened in my garden with *Romulea rosea*. I had plants that multiplied by off-sets but never seeded till some fresh blood was introduced; now they have become almost a weed on my rockery. I have tried pollen of *monophyllum* on *citrinus* but without result. *Monophyllum* itself was imported years ago, gave one or two flowers and then was lost through ignorance. I imported two dozen more 8 or 10 years ago and lost half of them the first season in a site where ordinary daffodils were quite happy. The survivors were salvaged and grown in a large flat pan on a sunny porch. Here they have been allowed to bake bone dry through the late summer and autumn and they have appropriated it; the flowers have in

creased from one or two yearly to a dozen and this year to over forty. The capacity of this plant to withstand drought is phenomenal. It is recorded that a bulb after twenty years in the Kew herbarium was planted and produced flowers! Success sometimes comes by trial and error. My bulbs themselves multiply and produce seed but seldom more than two or three in a pod so far, and only about half of these germinate. I have not yet ventured to plant them out in the open but when I do it will be in a mixture of crushed shell-rock and sifted soil in a well raised pocket against a sunny north wall: the freest of drainage and thorough baking must be provided for.

The flowers of *monophyllus* differ from those of other *bulbocodiums* in shape. The usual *bulbocodium* flower is a perfect cone and is carried at an angle of about 45 degrees above the horizontal. That of *monophyllus* starts as a cone, but after the insertion of the perianth, it expands widely into a much shorter flower than the others; also it opens more nearly vertically. It always makes me think of a little crinoline and is most dainty and charming. The stems are only about one inch high when the flower opens but grow up to three or four inches as the capsule ripens. I have never heard of any cross between *conspicuous* and any other species and my own few attempts in this line have all been failures. I have not had the opportunity of crossing *triandrus* and *monophyllus*, but as this has been done other crosses might conceivably succeed; so this year I have tried reciprocal crosses between *monophyllus* and *paper-white*, in each case four flowers. Three of the *monophyllus* flowers have formed no pods, but the fourth has a small one; probably one or two seeds have formed due to selfing; the *paper-white* was an isolated plant and the flowers were all emasculated; one was a failure from the start, but three pods formed and each has produced one seed. Perhaps it would cross with *Watieri*, but the cross could hardly be more beautiful than either of the parents.

Watieri was given me by Mr. Stevens and is now in its third season, coming as it does from the Atlas range I presumed it needed a hot, dry site such as I propose for *monophyllus*, so it was given such a spot among *cyclamens* from Lebanon; but it did not seem to thrive so it has been moved to a bed where *cyclamineus* flourishes. There it seems happy and gave six flowers: these are pure white on six inch stems; the perianth is like that of *Jonquilla* but wider, but the cup is nearly as broad as the perianth and has a faintly scalloped edge. It is a first-class little beauty. I sacrificed one flower for pollen, but the other five all seem to have set seed and the capsules are promisingly fat and large. The pollen was used mainly on *triandrus* flowers, both *albus* and *calathinus* and a cream seedling, and in each case seed seems to have set. One *minus* flower was available and has formed a pod, but the bulb seems to be sickening. This plant has introduced a whole new range of possibilities.